

Indirect Proof

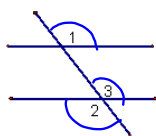
1. Assume conclusion is false
2. Reason until you contradict the given
3. State assumption is false

Also called proof by contradiction.

Example 2

Given: $\angle 1 \cong \angle 2$

Prove: $\angle 1 \cong \angle 3$



Assume $\angle 1 \not\cong \angle 3$

then $\angle 3 \cong \angle 2$ (b/c vert \angle s \cong)

then by transitive $\angle 1 \cong \angle 2$.

* Contradiction of our given

Our assumption is false

$\therefore \angle 1 \cong \angle 3$

Example 1

Given: Mary received an A on the test.

Prove: Her grade was $\geq 90\%$.

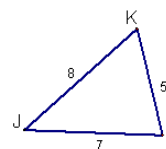
Assume Mary earned an 89.

Then she would have received a B, which contradicts our given.

Our assumption is false, Mary's grade was $\geq 90\%$.

Example 3

Given: picture



Prove: $m\angle K < m\angle L$

Case 1

Assume $m\angle K = m\angle L$

by Conv. of BAT $\overline{JL} \cong \overline{JK}$

* Contradicts our given

Case 2

Assume $m\angle K > m\angle L$

by thm 5.11 $\overline{JL} > \overline{JK}$

* Contradicts our given

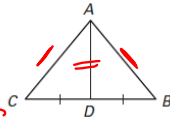
Our assumption is false

$\therefore m\angle K < m\angle L$

Indirect Proof Arrange statements A–F in order to write an indirect proof of Case 1.

GIVEN: \overline{AD} is a median of $\triangle ABC$.
 $\angle ADB \cong \angle ADC$

PROVE: $AB = AC$



Case 1:

F E B A D C

- A.** Then $m\angle ADB < m\angle ADC$ by the converse of the Hinge Theorem.
- B.** Then $\overline{BD} \cong \overline{CD}$ by the definition of midpoint. Also, $\overline{AD} \cong \overline{AD}$ by the reflexive property.
- C.** This contradiction shows that the temporary assumption that $AB < AC$ is false.
- D.** But this contradicts the given statement that $\angle ADB \cong \angle ADC$.
- E.** Because \overline{AD} is a median of $\triangle ABC$, D is the midpoint of \overline{BC} .
- F.** Temporarily assume that $AB < AC$.

Case 2 $AB > AC$

Attachments

Hinge_thm.gsp